REMARKS

Applicant thanks the Examiner for the courtesies extended during the recent interview on October 8, 2003. This submission, in connection with the accompanying RCE, is responsive to the issues raised in the final Office Action mailed April 16, 2003 (herein referred to as the "Office Action").

As discussed at the interview, Applicant is presenting a new set of claims via this RCE. Applicant believes that the new claims more clearly present the subject matter that Applicant regards as characterizing the present invention. As further discussed during the interview, this submission also correlates the terms utilized in the newly presented claims with the corresponding definitions of those terms as contained in the specification.

Status of the case prior to the RCE. Claims 17 – 20 are in the application. In the Office Action, which was made final, the Examiner rejected all of the pending claims under 35 U.S.C. § 103 (a) as obvious over Kleckner et al., WO 94120912 (published September 15, 1994) ("Kleckner") in light of Castagna, "Covariance and Contravariance: Conflict without a Cause," ACM Transactions on Programming Languages and Systems (TOPLAS), Vol. 17, No. 3 (1995) ("Castagna").

Amendment being made herewith in connection with the RCE. Applicant now cancels claims 17 – 20 without prejudice and presents a new set of claims, numbered 21-33. The claims newly presented herein contain no new matter. The newly presented claims comprise a series of claims all depending from a single independent claim, claim 21. These will be discussed seriatim.

Claim 21

Claim 21 expresses what Applicant believes is key to the present invention, i.e.,

> 21. A method for processing financial instruments comprising a representation of said instrument and at least one processor, wherein said at least one processor performs said processing by acting upon said representation, and wherein said representation is specified separately from said at least one processor.

Meaning of Claim Terms.

"Representation" of a financial instrument – The term "representation" in relation to a financial instrument is defined in the specification at p. 11, lines 8-20. It comprises both a "static

representation" of the instrument (as illustrated in the left column of Fig. 5), and an "event representation" of the instrument (see right column of Figs. 5, showing some examples of financial event streams that can be in such a specification). As explained at p. 11, lines 17-19 of the specification, "by definition, the event representation of a financial instrument can always be generated from its static representation" – i.e., the "static" and "event" representations of an instrument are representations of the same thing.

A description of what each instrument specification must entail is set forth in the specification at p. 15, lines 5-16. The specification further states at p. 18, line 25 – p. 19, line 2 that the "event stream representation maintains the full chronological list of all the financial events for the instrument and all of the dependencies between the events." In accordance with the foregoing definition, which is not limited with respect to the types of events that may affect an instrument, it should be understood that a "representation" as contemplated by claim 21 may model any contract that can be expressed as a series of interactions with the real world over some period of time.

"*Processing*" – The term "processing" as used in this claim is defined at p. 11, lines 3-4 of the specification ("The term 'processing' is used to cover any and all operations that can be applied to a financial instrument and its events.").

Antecedent support. The specification is built upon the conception that significant advantages may be realized in processing financial instruments by keeping the specification of the instruments separate from the specifications of the processors used to process the instruments. Direct support for this assertion is found throughout the specification. See, for example, p. 7, lines 3-6:

> "The essential concept that underlies all of our work in this area is that financial products can and should be modeled independently of their valuation methodologies."

p. 11, lines 2-7:

> "As stated earlier, processing is independent from the framework for definition of financial instruments . . . The intention of this model is that all processing functionality interfaces with the financial instruments in a well defined and structured way such that its separation from the instrument definition models remains intact."

p. 39, line 25 – p. 40, line 4:

> "As stated numerous times above, one of the key design goals was to separate the description of financial instruments from the processing of the instrument. Processing objects take the event representation of an instrument, i.e., its macro structure, and operate on the events and parameters to compute some output value or values. This was done to allow development of new instruments to proceed orthogonally to the development of new processing functionality."

See also p. 40, lines 10-18 (elaborating on how the processing of an instrument is performed in accordance with the present invention); Fig. 7 (depicting processing objects separate from representations of a financial instrument, which process the instrument by acting on such representations); and related discussion at p. 29, line 30 – p. 31, line 2.

Novelty. The approach reflected by this claim represents a substantial departure from prior art practice, even with respect to prior art systems developed under object oriented methodologies. As explained in the specification (at p. 50, lines 15-17): "The classic object oriented view is that the definition of an object should encompass its state and its behavior. This design, on the other hand, specifically and explicitly separates what can be considered behavior from the description."

Under prior art object oriented approaches, in order to add new or different processing capability to an existing system,

> "all existing implementations of financial instruments would have to have the additional interface [i.e., to the new processing function] individually coded by a developer. As the total number of supported instruments grows, this becomes quite a difficult task. Each new interface can require an inordinate amount of effort, especially if the internal complexity of each existing instrument is not well understood by the developer tasked with upgrading it." (Specification, p. 51, lines 16-20.)

The present invention, by separating processing from the instrument specification, mitigates this problem. It permits "a new processing class to operate on all existing financial instruments as well as any new instruments," which "reduces the extension of the interface to a single development step as opposed to a series of steps that will get more difficult as the system grows" (specification, p. 51, lines 21-26). The present invention, for example, allows alternate valuation methodologies easily to be employed, as well as any other types of processing (such as settlement, integration with legacy systems or other departments having different systems), that may be desired during the life cycle of a financial instrument. Specification, pages 52-55.

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Applicant is aware of no prior art that teaches or suggests, with respect to a system or method for processing financial instruments, the steps of specifying a financial instrument in a manner that does not also describe the processing to be performed, and processing the instrument using a processor that is specified separately from the instrument.

For example, the primary reference cited in this case, Kleckner, teaches a system wherein the processing functionality is incorporated in every instrument. Fig. 8 of Kleckner, which Kleckner uses as a basic example, depicts an instrument whose processing (to produce a Net Present Value (NPV)) is defined in conjunction with the remainder of the instrument specification:
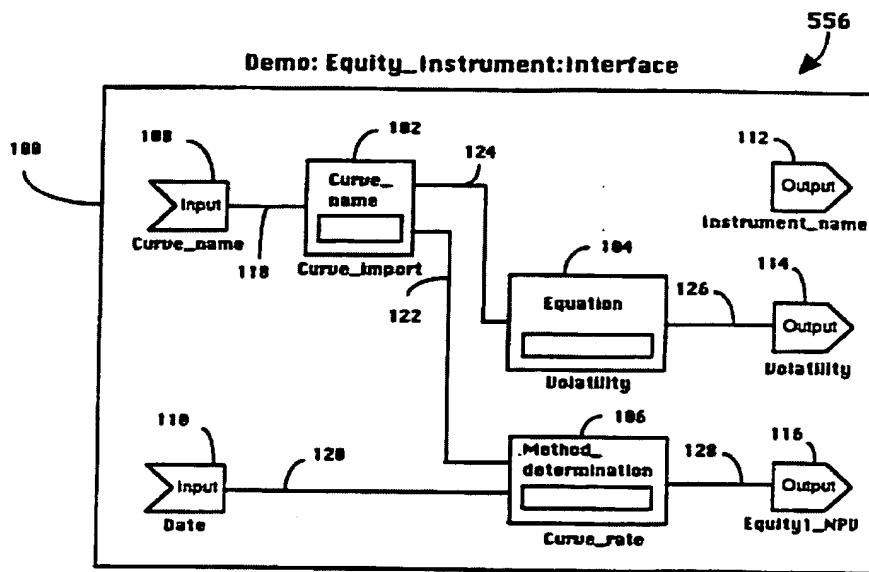

Fig. 8   **(Kleckner)**

As can be seen from Fig. 8, the "Curve_rate" "Method_determination" 106 is incorporated as an element within the representation of an Equity Instrument. It is also readily apparent from Fig. 8 that the "Curve_rate" in turn requires "Curve_Import" 122 as an input. *Such a requirement of a specified input to feed a processor defined within the instrument's own specification effectively limits the instrument and its processing to the one methodology of that processor, and to the one set of inputs adapted to the same methodology.* This characteristic of Kleckner is directly contrary to the teachings and claims of the present invention, which require the processing to be specified separately from the representation of the instrument.

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The commingling of representation and functionality is not an isolated anomaly of Fig. 8 of Kleckner. It is reflected throughout Kleckner (see for example the "Volatility" inputs in many of the other figures, as well as the chaining of input dependencies in the spread options). Indeed, the interdependencies of inputs and processing is apparent in nearly every aspect of Kleckner's functionality, severely limiting the practical utility of a system based on the teachings of Kleckner.

The present invention, by contrast, was designed specifically to avoid this aspect inherent in Kleckner, so as to achieve key advantages that were not practicable under the prior technology. As referred to above, these include long term design stability in view of changing business requirements, both with regard to the ability to accommodate newly developed instruments as well as the ability to utilize new methods of processing existing instruments. In addition, the present invention has the further advantage of permitting a business to choose among alternative processing methodologies, for example pricing methodologies, which cannot easily be done under prior art systems (see for example p. 52, lines 18-19, as well as Fig. 7 of the present application, which depicts a Methodology #1" and "Methodology #2" for separate processing objects). Another benefit discussed in the specification is the ability to use inheritance to share behavior among processing objects, which cannot be done where processing behavior is implemented directly on the instrument (such as in Kleckner), without a large degree of code duplication.

In sum, Applicant is asserting that as of the dates relevant to the present application, the method of separating the specification of a financial instrument from the specifications of its processors had neither been conceived nor practiced by others in the field, and that it is neither reflected in nor suggested by any of the patent or non-patent literature from the period.

Claim 22

> 22. The method of claim 21, wherein said representation further comprises said instrument's inputs, the relationships of said inputs with each other, and how said relationships combine to produce a series of financial event streams.

Antecedent support. The manner in which an instrument is represented by means of its inputs, the relationships of the inputs with each other, and how said relationships combine to

produce a series of financial event streams is described at length in the specification. *See, e.g.,* Figs. 4 – 7, discussed at length at pages 9 – 22 of the specification.

Novelty. This claim is dependent from claim 21 and recites further aspects that may comprise the content of the instrument specification. Since this claim is narrower than the base claim, it should be allowed if the base claim is allowable. *See* MPEP 608.01(n). Moreover, with regard to claim 22, Applicant is aware of no prior art system in which an instrument was comprised of the elements recited in claim 22.

Claim 23

23. The method of claim 22, wherein the processing performed by such processor may further comprise the processing of the instrument's inputs and the relationships of said inputs with each other in order to produce a series of financial event streams.

Antecedent support. Support for this claim is found in the description in the specification of the "event extraction" process, at pages 22-37. As explained therein, "event extraction" is an example of a processor that processes an instrument's inputs and the relationships of said inputs with each other in order to produce a series of financial events streams. (Note also that "event extraction" is an example of a "processor" that acts on the static representation of an instrument, as opposed to the "event" representation, and in fact *creates* the event representation from the static representation.)

Novelty. This claim is ultimately dependent from claim 21 and thus incorporates as a claim element the separation between an instrument's representation and its processing and accordingly should be patentable if the base claim is patentable. Moreover, applicant is aware of no prior art system comprising an instrument specified separately from its processors in which one such processor was used to act on the instrument representation in order to produce a series of financial event streams.

Claim 24

24. The method of claim 23, further comprising the processing of said event streams.

Antecedent support. This claim concerns the processing performed on event streams, which themselves comprise an alternate representation of the instrument, which alternate

representation was itself generated by a processor from an underlying instrument specification as recited in claim 23 (i.e., this claim implicates two stages of processing, the first to generate the event streams – resulting in a structure that also constitutes a representation of the instrument – and the second to process the event streams). Support for this claim is found at pages 39-52 of the specification.

Novelty. Applicant is aware of no prior art with respect to this claim.

Claims 25 and 26

25. The method of claim 23, wherein said processing is implemented via a double dispatch mechanism.

26. The method of claim 24, wherein said processing is implemented via a double dispatch mechanism.

Antecedent support. Specification, e.g., p. 24, lines 19-22, p. 25, line 7-13, p. 30, lines 15-27 and pages 22-37 generally (with respect to claim 25) and p. 44 line 20 to p. 46 line 13 and pages 40-46 generally (with respect to claim 26).

Novelty. Claims 25 and 26 depend ultimately from claim 21, through claim 22 and then through claims 23 and 24 respectively and incorporate all of the limitations of those claims. As discussed above in connection with claim 22, if the underlying methods are novel and nonobvious (and as stated above, Applicant believes that they are), then Applicant should also be entitled to dependant claims that recite a particular method of implementing those methods (regardless of whether the particular manner of implementation was previously known).

Claims 27 and 28

27. The method of claim 23, wherein said processing is implemented via polymorphism.

28. The method of claim 24, wherein said processing is implemented via polymorphism.

Antecedent support. Specification, p. 32, lines 3-5, describing alternate implementation in Smalltalk (wherein the information about the appropriate method to call "is encoded in the method name"), which an ordinarily skilled programmer would readily recognize could be implemented via polymorphism without double dispatching.

Novelty. Again, these claims are dependent claims concerning the manner of implementation, and should be patentable if the base claims are novel and nonobvious.

Claim 29

> 29. The method of claim 24, wherein a plurality of processors may be utilized to provide alternate methods of performing a type of processing upon said instrument without changing the representation of said instrument.

Antecedent support. Specification, p. 51, lines 11-56.

Novelty. In addition to being dependent from an otherwise patentable claim, Applicant is not aware of any prior art that provides for functionality comparable to that which is claimed here. As explained in the cited portion of the specification, the functionality of this claim cannot be achieved in a prior art system such as that taught by Kleckner without an inordinate amount of effort. This is one of the principal advantages that flows from the separation of processing from instrument specification. There is an entire section of the specification that discusses this, under the heading "Benefits of Separation of Processing from Instrument Specification," at pages 50-52.

Claims 30 and 31

> 30. The method of claim 22 wherein said representation is composed from a set of primitives.

> 31. The method of claim 23 wherein said representation is composed from a set of primitives.

Antecedent support. Specification, p. 8, lines 12-25 (using the terminology "financial event template" and "financial event component" to denote what claims 30 and 31 refer to as a "primitive").

Novelty. Representation composed from an established set of primitives is related to the ability to have an instrument processed by a processor that is specified separately from the instrument. There is no such teaching in any prior art of which Applicant is aware.

Claims 32 and 33

Claims 32 and 33 are multiple dependent "system" and "programmed medium" claims corresponding (in the alternative) to claims 21-31. Antecedent support is provided at p. 5, lines 20-24 of the specification. Given the patentablilty of the base claims, Applicant should be entitled to these claims as well. *See, e.g., In re Lowry,* 32 USPQ2d 1031 (Fed. Cir. 1994); *In re Beauregard,* 35 USPQ2d 1383 (Fed. Cir. 1995).

Comment regarding Cancellation of Claims

Applicant believes that the subject matter of claims 17-20, cancelled herewith without prejudice, was in each case patentable over Kleckner and Castagna. However, Applicant, on reconsideration, deemed said claims to have been too limiting with respect to the details of implementation. Applicant believes that the present set of claims more clearly presents the subject matter that Applicant regards as characterizing the invention.

Applicant believes that the amendments being made herewith are by no means "narrowing amendments." Nevertheless, even though the present claims are in certain respects broader than the claims that were previously rejected, Applicant believes that, as discussed above, each and every claim submitted herewith is fully supported by the original disclosure, and may be readily distinguished from anything that was taught or suggested by the prior art.
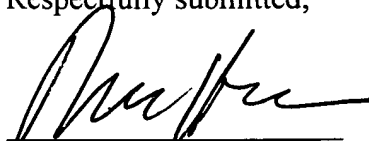
Information Disclosure Statement. Applicant states that it is not aware of any references other than those already of record that are material to patentability of the claims presented herein. Applicant submits the accompanying IDS, but states that it does not believe that either of the two references listed therein are material to patentability in that each is dated well after the filing date of the present application.

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CONCLUSION

Once again, the Applicant thanks the Examiner for his work on this case. The Applicant respectfully requests that the new claims presented herein be considered, further examined to the extent considered necessary by the Examiner, and that claims 21-33 as hereby added be allowed.

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